# OXYLOMA DEPRIMIDA, A NEW SPECIES OF SUCCINEIDAE (PULMONATA)

**Dorothea S. Franzen**
Illinois Wesleyan University
Bloomington, Illinois 61701

ABSTRACT

Oxyloma deprimida, *a new species of Succineidae (Pulmonata) is described from Utica, LaSalle County, Illinois, (type locality) and near Canton Lake, NE of Canton, Fulton County, Illinois. The nuclear whorl of the shell is depressed, hence, the species name* deprimida. *The habitat of* O. deprimida *is on cattails generally 3 to 5 ft. above the wet ground or water level. The snails mature in the fall and not in the summer as does* O. retusa, *a sympatric species. Anatomical features include a broadly based penial appendix and an albumen gland which is smaller than the prostate gland.*

The search for succineas in the state of Illinois has resulted in the recognition of a hitherto undescribed species, *Oxyloma deprimida,* new species.

*Description of Holotype:* The amber-colored, ovate, imperforate shell, composed of three inflated whorls, is thin, fragile, shiny, and marked only by fine striae. The nuclear whorl is depressed (Fig. 1, upper right), rough and pitted (Fig. 1, lower left). The whorls increase rapidly in size from the nuclear to the body whorl. The suture is sharply incised resulting in a slight shouldering along the upper border of the whorl. The peristome of the ovate aperture is sharp and continuous over the surface of the body whorl in the form of a thin, white callus (Fig. 2, left). The narrow, white columella follows the inner border of the peristome (Fig. 2, left). The dimensions of the shell are: height, 12.45 mm.; width, 7.6 mm.; height of aperture, 9.85 mm.; width of aperture, 5.7 mm. The ratios of the several dimensions are shown in Table I.

The surface of the head and the body wall are cream-colored and coarsely and irregularly tuberculate. The pigmentation of the anterior dorsal portion of the head consists of black blotches arranged in five, indistinctly defined, longitudinal bands that form a shield-shaped pattern (Fig. 2, right). They converge medially between the posterior tentacles and then spread apart continuing as two bands towards the mantle. The shield pattern is flanked on either side by a pigmented band, narrow anteriorly, but broadening at the base of the posterior tentacles as it continues to the mantle. On

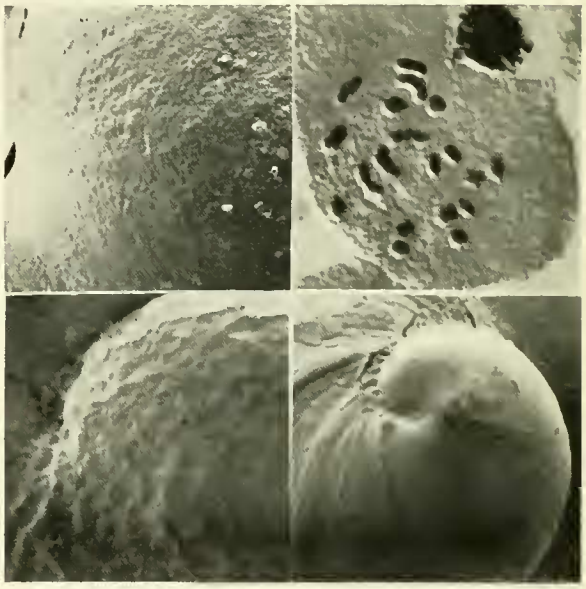

FIG. 1. **Upper left,** *Chromosomes of an ovotestis smear of* Oxyloma deprimida *from the type locality. Enlarged.* **Upper right,** *Scanning-electron-photomicrograph showing the nuclear whorl of* Oxyloma deprimida *of a shell from the type locality. Enlarged.* **Lower left,** *Scanning-electron photomicrograph of the nuclear whorl of* Oxyloma deprimida *of a shell from the type locality, showing surface detail. Enlarged.* **Lower right,** *Scanning-electron-photomicrograph of the nuclear whorl of a shell of* Succinea luteola, *showing surface detail. Enlarged.*

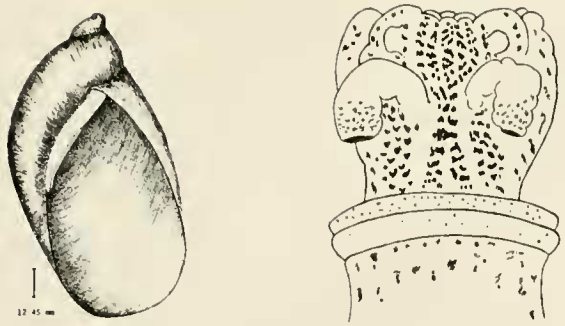

FIG. 2. *Drawings of the holotype of* Oxyloma deprimida. **Left,** *shell drawn to scale as indicated.* **Right,** *head and anterior portion of mantle. Enlarged.*

the lateral body wall flecks of light pigmentation form a broad band that tapers and diminishes posteriorly. The mantle collar is lightly pigmented on the upper and outer surface and more heavily pigmented on the anterior and inferior surface. The pigmentation of the anterior portion of the mantle occurs as widely-spaced blotches (Fig. 2, right). The anterior border of the nephridium is outlined by a narrow, broken, black band whereas the posterior border is outlined by a broader, darker band. Sparse, scattered patches of pigment occur on the remainder of the body. The genital aperture, crescent-shaped, 2 mm. in length, surrounded by a white, tumid lip, is situated on the anterior right-hand side of the body. A pedal groove, continuous from the labial palp to the posterior tip of the body, separates the foot from the lateral body wall; the pedal groove is paralleled dorsally by a less-pronounced, suprapedal groove. Shallow, vertical grooves incise the pedal and suprapedal grooves and the broad, pigmented band. These vertical grooves produce a series of shallow scallops along the margin of the pedal groove especially when the animal is in a somewhat contracted state.

*Holotype:* catalogue no. FMNH 176002; paratypes nos. FMNH 176003, FMNH 176004, and FMNH 176005, Molluscan Collection, Field Museum of Natural History, Chicago, Illinois. Additional paratypes are in the private collection of the author.

The author has examined shells of succineas of the collection in the Natural History Museum, University of Illinois. A shell identified by Frank Collins Baker (1939) as *Succinea retusa peoriensis* Wolf and which Pilsbry (1948) identified as *Oxyloma decampi peoriensis* (Walker), as indicated below, is herein identified as *Oxyloma deprimida,* new species.

*Synonymy* —

*Succinea retusa peoriensis* Wolf. Frank Collins Baker, 1939. Fieldbook of Illinois Land Snails, Manual 2, Natural History Survey Division, p. 126, Fig. E, left-hand figure only.

*Oxyloma decampi peoriensis* (Walker), Henry A. Pilsbry, 1948. Land Mollusca of North America, Vol. II, Pt. 2, p. 785, Fig. 420, b, left-hand figure only.

*Known geographic distribution and habitat:* 1. Type locality: Field No. D.S.F. 350; NE¼ SW¼ S 9, Twp. 33 N, R 2 E, Utica (N. Utica), LaSalle County, Illinois, about ½ mile east of the crossing of Illinois Highway 178 over the Rock Island and Pacific railroad tracks, between the Rock Island and Pacific railroad tracks and Clark Run Creek. The habitat is the shore of a water-filled pit on the northern edge of Clark Run Creek that supports cattails (*Typha* sp.), goldenrod (*Solidago* sp.), and willow (*Salix* sp.). *Oxyloma deprimida* lives on the cattails several feet (2 to 5) above the wet ground and/or above the water level.

An earlier unpublished record of the species taken from "Utica, Illinois" is in the Molluscan Collection of the Field Museum of Natural History, Chicago, Illinois. The shells, catalogue no. 58198, were identified as *Succinea (Oxyloma) decampi* Bryant Walker. They were formerly in the James H. Ferriss collection and identified as *Succinea retusa peoriensis* Wolf.

Locality: 2. Field No. D.S.F. 194; NE¼ SE¼ NW¼ S 19, Twp. 7 N, R 5 E; 3 miles NE of the town square in Canton, Fulton County, Illinois. The habitat is a lowland adjacent to a northeastern arm of Canton Lake where moist ground supports a stand of cattails and willows. *Oxyloma deprimida* lives on this vegetation 3 to 5 feet above the ground, and is not found on the ground where lives *O. retusa* (Lea), a sympatric species. This association does not, however, occur at the Utica locality.

*Anatomy of paratypes:* The large, coiled, heavily pigmented hermaphroditic duct, coming from the ovotestis, enters the fertilization sac which is connected with the seminal vesicles. The relatively large, twinned, unequal seminal vesicles are coarsely peppered with black pigmentation whereas the in-

flated fertilization sac is lightly pigmented. The prostate gland is situated immediately anterior to the albumen gland. The acinar prostate gland is covered by a thin, lightly pigmented sheath, and is larger than the albumen gland. The albumen gland, about two-thirds the length of the prostate, is composed of acini which are smaller than those of the prostate gland. The single duct leading from the fertilization sac divides to form two ducts, one leading into the prostate gland and the other forming the oviduct (Fig. 3, F).

The vagina is straight, slightly pigmented, equal to about seven-eighths of the length of the penis, and opens along with the penis into the genital antrum. The oviduct is highly convoluted, slightly pigmented, and enters the distal end of the vagina as does the spermathecal duct. The spermathecal duct loops over the oviduct just prior to its entry into the vagina.

The retractor muscle of the right posterior tentacle passes between the penis and the vagina. The penis is enclosed in a thin, translucent sheath peppered with black pigment in the middle or towards its distal end. The vas deferens may or may not be lightly stippled. As the vas deferens approaches the distal end of the penial sheath it loops ventrally under the penial retractor muscle and enters the penial sheath terminally; then known as the epiphallus, it coils, increases in caliber as it approaches the penis and becomes enlarged just before it merges with the penis subterminally (Fig. 3, A). The penial appendix, because of its broad base, appears to be a terminal extension of the penis rather than an appendix separated from the body of the penis by a constriction. The size and shape of the penial appendix is variable (Fig. 3, A - E).

The ovotestis of many individuals of *Oxyloma deprimida,* from both localities, were squashed and stained with orcein. Examinations of the stained chromosomes in metaphase revealed the haploid number of nineteen to be characteristic of this species (Fig. 1, upper left). This is the same number found in *O. retusa* (Lea), *O. haydeni* (W. G. Binney) and *O. salleana* (Pfeiffer), (Franzen, 1966, p. 67).


FIG. 4. *Representative teeth of a radula of a snail taken from near Canton Lake; 3 mi. NE Canton, Illinois. C, central tooth; 1-R-L, 1st right lateral; 2-R-M, 2nd right marginal; 4-R-M, 4th right marginal; 21-R-M, 21st right marginal.*

The radula (Fig. 4) is composed of many rows of teeth and numerous teeth to a row. The number of rows in 6 radulae examined, ranged from 90 to 116. The numbers of marginals and laterals of representative rows of 5 radulae are to be noted in Table II. The ratios of marginals to laterals approaches 1:3 and 1:4. This compares with what has been reported for *Oxyloma retusa,* (Franzen, 1963, Table II, p. 89) and for *O. haydeni,* (Franzen, 1964, Table II, p. 78).

The structural details of the individual teeth resemble those of the genus in general (Fig. 4). The central tooth has a broad basal plate which has a lateral basal pointed projection on either side. The pointed mesocone, somewhat variable in length, does not usually extend to the lower margin of the basal plate. A shorter, pointed ectocone flanks the mesocone on either side. The laterals have a large, pointed mesocone which, like that of the central tooth, is usually not as long as the basal plate; the single ectocone, sometimes divided into two—especially of the more lateral teeth—is pointed; a short, pointed endocone may be present. The marginals, smaller than the laterals, have a long, slender basal plate which is characteristic of the genus *Oxyloma* (Quick, 1933:296, Fig. 1, *Oxyloma (Succinea) pfeifferi* Rossm.). Of the cusps of the marginals, the mesocone is the largest, the endocone is small and pointed. The ectocone of about the six medial-most marginals is divided into two unequal cusps of which the lateral-most is the largest, and curved. The ectocone of the more lateral marginals is divided into three cusps of which the outermost is the largest. The ectocone of the marginals nearest the outer side of the radula may be divided into four cusps of which the outermost is short and pointed. The features of the amber-colored jaw are typical of the genus. A prominent median fold projects anteriorly and is flanked on either side by a broadly rounded fold.

The surfaces of the bodies of the paratypes are, as in the holotype, cream-colored and coarsely and irregularly tuberculate. The pattern of pigmentation of the head and body is like that of the holotype

although the intensity of pigmentation is variable. The sole of the foot may be lightly or not at all speckled. The most striking variation of pigmentation is that of the mantle. The pattern of the anterior portion may be in the form of black, widely-spaced blotches, as in the holotype, or heavier blotches arranged in indistinctly defined rows connected by less intense stripes of pigment, or the blotches may merge, resulting in an irregular pattern. The amount of pigmentation anterior to the nephridium varies from light to heavy, the latter in the form of a dark area interspersed by fine-lined, light streaks. The intensity of the pigmentation outlining the nephridium is light in some individuals and more intense in others. The pigmentation of the area posterior to the nephridium varies from a few scattered blotches to many patches merging to form a more overall pattern extending to the posterior tip of the animal.

*Shell of paratypes:* The shell of the mature snail, attaining a height of almost 13.5 mm., is comprised of 2½ to 3 inflated whorls. The surface of the nuclear whorl is rough and pitted (Fig. 1, lower left) but not distinctly malleated as in *Succinea luteola* Gould (Fig. 1, lower right), *S. vaginacontorta* Lee, and *S. campestris* Say.

Dimensions of the three largest shells, number of shells measured, and the median of each series measured, are recorded in Table I. The range of the greatest height of the series of shells included in this study is from 9.8 mm. to 13.46 mm.; and the range of the greatest width is from 6.7 mm. to 8.4 mm. The greatest height of shells obtained from the Canton Lake locality is 11.8 mm.; the greatest diameter is 8.4 mm. (October, 1960); the comparable dimensions of shells of the Utica locality are, greatest height, 13.46 mm., greatest diameter, 8.04 mm. (September, 1967).

*Distinctive characteristics of Oxyloma deprimida:* The name of the species, *deprimida*, denotes the depressed position of the nuclear whorl (Fig. 1, upper right) as contrasted with the prominent, knoblike nucleus which is characteristic of other known species of the genus. The tip of the nuclear whorl appears to be somewhat "tucked in" under the penultimate whorl.

The epiphallus enters the penis subterminally which produces a terminal extension of the penis, the penial appendix. In *O. deprimida* the base of the penial appendix is broad which makes it appear to be a terminal extension of the penis rather than an appendix distinctly separated from the body of the penis by a constriction as in, for example, *O. haydeni*, (Franzen, 1964, Fig. 1). The epiphallus enlarges as it approaches the penis and merges imperceptibly with it.

The albumen gland is smaller than the prostate gland and is located posteriorly to it. The acini of the albumen gland are distinctly smaller than are those of the prostate.

*Oxyloma deprimida* lives on cattails and willows generally 3 to 5 feet above the ground and/or the water level, not on the ground nor on objects floating on the water. The last time the type locality was visited (September 28, 1971) the water had receded to the level of the small stream as a

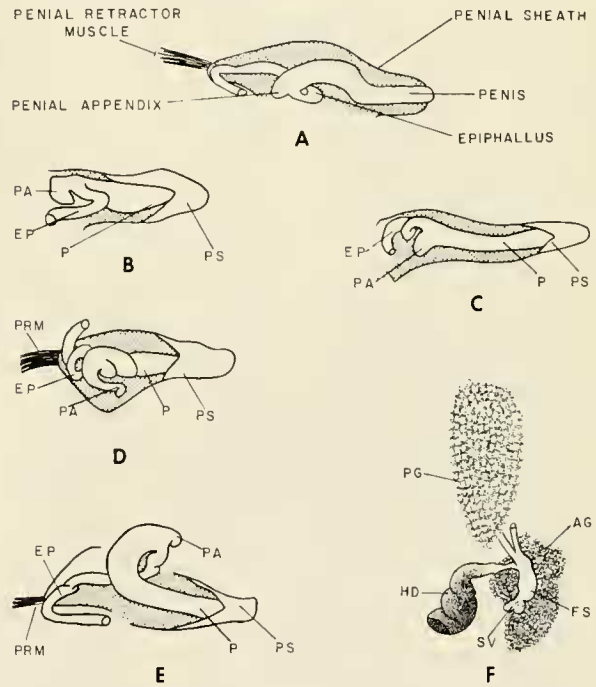


FIG. 3. *Drawings of genital organs of* Oxyloma deprimida: *A - E, penis, penial appendix and epiphallus shown inside of penis sheath cut open. The figures are of snails from the following localities: A, near Canton Lake, 3 mi. NE Canton, Illinois; B, Utica, Illinois; C, Utica, Illinois; D, Utica, Illinois; E, near Canton Lake, 3 mi. NE Canton, Illinois. F, prostate gland and albumen gland of a snail from the Utica, Illinois, locality: PG, prostate gland; AG, albumen gland; FS, fertilization sac; SV, seminal vesicles; HD, hermaphroditic duct.*

TABLE 1. *Dimensions of the shells of* Oxyloma depressa. *The measurements are of the 3 largest shells of each of the 9 series as indicated. In the 4th column of measurements are listed the ratios of the width of the shell over its height. In the last 3 columns are listed the ratios of the height of the aperture over the height of the shell, width of aperture over width of shell, width of aperture over height of aperture.*

| | No. of Whorls | Height | Width | Width/ Height | Height of Aperture | Width of Aperture | H. Ap./ H. Shell | W. Ap./ W. Shell | W. Ap. H. Ap. |
|---|---|---|---|---|---|---|---|---|---|
| Holotype | 3 | 12.45 mm | 7.6 mm | .610 | 9.85 mm | 5.7 mm | .79 | .750 | .578 |
| Field # 350 | 2 3/4 | 10.74 mm | 6.80 mm | .633 | 8.16 mm | 4.88 mm | .760 | .718 | .598 |
| Type Locality | 3 | 10.24 | 6.33 | .618 | 7.50 | 4.50 | .732 | .711 | .600 |
| Utica, Ill. | 3 1/8 | 10.03 | 6.10 | .608 | 7.38 | 4.45 | .736 | .729 | .603 |
| Oct. 22, 1966 | | | | | | | | | |
| Range (32 shells) | 2 1/4-3 1/8 | 6.71-10.74 | 4.07-6.8 | .550-.673 | 5.13-8.16 | 3.24-4.88 | .710-791 | .659-.806 | .544-.677 |
| Median | | 8.85 | 5.54 | .619 | 6.66 | 3.99 | .759 | .718 | .598 |
| Field # 350 | 3 | 13.46 mm | 7.75 mm | .576 | 9.54 mm | 5.66 mm | .709 | .730 | .593 |
| Utica, Ill. | 2 7/8 | 13.17 | 8.04 | .610 | 9.94 | 5.79 | .755 | .720 | .582 |
| Sept. 30, 1967 | 3 1/8 | 12.84 | 7.72 | .601 | 9.61 | 5.81 | .748 | .752 | .604 |
| Range (74 shells) | 2 1/2-3 1/8 | 8.24-13.46 | 4.64-8.04 | .553-.668 | 6.06-9.94 | 3.36-5.89 | .709-.798 | .681-.795 | .549-.651 |
| Median | | 10.84 | 6.53 | .599 | 8.11 | 4.79 | .744 | .733 | .594 |
| Field # 350 | 3 | 12.89 mm | 7.33 mm | .569 | 9.52 mm | 5.72 mm | .738 | .780 | .601 |
| Utica, Ill. | 3 | 12.39 | 7.12 | .575 | 8.49 | 5.27 | .685 | .740 | .621 |
| Sept. 19, 1970 | 3 | 12.26 | 7.10 | .579 | 8.47 | 5.30 | .691 | .746 | .626 |
| Range (107 shells) | 2 3/4-3 1/4 | 7.9-12.89 | 4.90-7.37 | .499-.654 | 6.05-9.52 | 3.5-5.72 | .673-.808 | .670-.799 | .539-.736 |
| Median | | 10.88 | 6.41 | .597 | 8.0 | 4.76 | .737 | .741 | .600 |
| Field # 350 | 3 | 12.45 mm | 7.60 mm | .610 | 9.85 mm | 5.70 mm | .791 | .750 | .579 |
| Utica, Ill. | 3 | 12.30 | 7.40 | .602 | 9.30 | 5.80 | .756 | .784 | .624 |
| Sept. 28, 1971 | 3 | 12.25 | 7.25 | .592 | 9.55 | 5.85 | .780 | .807 | .613 |
| Range (157 shells) | 2 1/2-3 | 7.74-12.45 | 4.53-7.60 | .532-.717 | 5.88-9.85 | 3.71-5.85 | .674-.883 | .679-.852 | .570-.663 |
| Median | | 9.58 | 5.85 | .613 | 7.29 | 4.48 | .759 | .768 | .615 |
| Field # 194 | 3 | 11.5 mm | 8.2 mm | .713 | 9.1 mm | 5.8 mm | .791 | .707 | .637 |
| Canton Lake, Ill. | 3 1/8 | 11.2 | 7.8 | .696 | 8.9 | 5.6 | .795 | .718 | .629 |
| Oct. 6, 1956 | 3 1/4 | 11.1 | 7.8 | .703 | 8.3 | 5.2 | .748 | .667 | .626 |
| Range (7 shells) | 2 7/8-3 1/4 | 10.8-11.5 | 7.2-8.2 | .661-.759 | 8.0-9.1 | 5.1-5.8 | .734-.806 | .654-.718 | .600-.655 |
| Median | | 11.1 | 7.8 | .703 | 8.5 | 5.5 | .766 | .683 | .637 |
| Field # 194 | 2 7/8 | 10.3 mm | 7.6 mm | .738 | 8.2 mm | 5.4 mm | .796 | .711 | .659 |
| Canton Lake, Ill. | 3 | 9.6 | 6.4 | .667 | 7.0 | 4.4 | .729 | .689 | .629 |
| Sept. 14, 1958 | 2 7/8 | 9.2 | 6.2 | .674 | 7.0 | 4.4 | .761 | .709 | .629 |
| Range (30 shells) | 2-3 | 4.8-10.3 | 3.4-7.6 | .625-.738 | 3.7-8.2 | 2.2-5.4 | .719-.852 | .629-.809 | .579-.684 |
| Median | | 7.8 | 5.0 | .675 | 5.8 | 3.6 | .769 | .714 | .638 |
| Field # 194 | 2 3/4 | 11.8 mm | 8.4 mm | .712 | 9.2 mm | 5.9 mm | .780 | .702 | .641 |
| Canton Lake, Ill. | 2 7/8 | 11.4 | 7.8 | .684 | 8.6 | 5.3 | .754 | .679 | .616 |
| Oct., 1960 | 2 7/8 | 10.9 | 7.8 | .716 | 8.6 | 5.7 | .789 | .731 | .663 |
| Range (26 shells) | 2 1/4-3 | 6.6-11.8 | 4.6-8.4 | .678-.807 | 5.1-9.2 | 3.3-5.9 | .717-.848 | .600-.731 | .571-.687 |
| Median | | 9.3 | 6.7 | .710 | 7.4 | 4.6 | .776 | .679 | .636 |
| Field # 194 | 3 1/4 | 9.8 mm | 6.7 mm | .684 | 7.4 mm | 4.7 mm | .755 | .701 | .635 |
| Canton Lake, Ill. | 2 7/8 | 9.8 | 6.7 | .684 | 7.3 | 4.7 | .745 | .701 | .644 |
| Oct., 1964 | 2 3/4 | 9.8 | 6.7 | .684 | 7.4 | 4.7 | .755 | .701 | .635 |
| Range (16 shells) | 2 1/2-3 1/4 | 7.4-9.8 | 5.5-6.7 | .684-.743 | 6.1-7.4 | 3.8-4.7 | .740-.824 | .652-.737 | .597-.667 |
| Median | | 9.2 | 6.5 | .710 | 7.0 | 4.4 | .780 | .701 | .645 |
| Field # 194 | 3 | 9.92mm | 5.79mm | .584 | 7.29mm | 4.55 mm | .735 | .786 | .624 |
| Canton Lake, Ill. | 3 | 9.47 | 6.05 | .639 | 7.23 | 4.60 | .763 | .760 | .636 |
| Oct., 1966 | 3 | 9.46 | 7.0 | .740 | 7.14 | 4.24 | .755 | .606 | .594 |
| Range (39 shells) | 2-3 | 6.06-9.92 | 3.57-7.0 | .583-.740 | 4.44-7.29 | 2.91-4.60 | .609-.792 | .606-.825 | .564-.752 |
| Median | | 7.93 | 4.96 | .627 | 5.90 | 3.67 | .750 | .747 | .622 |

result of a period of about a year of low precipitation. The ground of the usually submerged area was wet though not muddy. Even under such conditions *O. deprimida* was not found on the ground. Many of the snails were aestivating on the cattails 2 feet above the ground.

*Oxyloma deprimida* differs from other species of the genus, at least in the Mississippi Valley, as to the time of year in which it reaches maturity. The mature, fully grown, sexually active adults are to be found from the latter part of September to the early part of October. This is several months later

TABLE 2. *Formulae of representative rows of teeth of* Oxyloma deprimida *new species.*

| Station | Slide | No. of Rows of Teeth | Row | M | L | C | L | M |
|---|---|---|---|---|---|---|---|---|
| Type Locality | A | 105 | 14 | 7 | 12 | 1 | 13 | 6 |
| Utica, Illinois | | | 32 | 42 | 12 | 1 | 15 | 37 |
| Field No. 350 | | | 77 | 37 | 14 | 1 | 13 | 37 |
| | B | 110 | 40 | 37 | 12 | 1 | 12 | 37 |
| | | | 87 | 37 | 10 | 1 | 9 | 41 |
| | C | 100 | 23 | 33 | 12 | 1 | 9 | 26 |
| Canton, Illinois | A | 92 | 23 | 34 | 16 | 1 | 9 | 37 |
| Field No. 194 | | | 30 | 40 | 10 | 1 | 10 | 39 |
| | B | 99 | 65 | 37 | 11 | 1 | 9 | 39 |
| | | | 74 | 39 | 10 | 1 | 10 | 39 |

*TABLE 3. Comparisons of the medians of ratios of several dimensions of* Oxyloma deprimida *with several other species of* Oxyloma *as previously reported (Franzen, 1969, Table III).*

| Species | W. of Shell/ H. of Shell | H. Aperture/ H. Shell | W. Aperture/ W. Shell | W. Aperture/ H. Aperture |
|---|---|---|---|---|
| *O. deprimida* | 59.7%.- 71.0% | 73.7% - 78.0% | 67.9% - 76.8% | 59.4% - 64.5% |
| *O. retusa* | 52.0% | 74.4% | 80.5% | 57.1% |
| *O. haydeni* | 49.0% | 73.0% | 85.3% | 57.6% |
| *O. salleana* | 56.3% | 78.6% | 79.2% | 57.6% |
| *O. sanibelensis* | 47.8% | 60.7% | 68.8% | 55.2% |

than the maturation time of *O. retusa, O. haydeni,* and *O. salleana* whose mature adults disappear in the latter part of June or in early July.

ACKNOWLEDGMENTS

National Science Foundation Grants-in-Aid No's. NSF G18000 and NSF GB2715 provided laboratory equipment and supported, in part, the field studies. The author is grateful to Dr. B. V. Hall, Director, Center for Electron Microscopy, Univ. of Illinois, Urbana, and to Dr. James Anderson for the scanning-electron-photomicrographs. Dr. Alan Solem, Field Museum of Natural History, Chicago, Illinois, and Dr. Donald F. Hoffmeister, Natural History Musuem, Univ. of Illinois, Urbana, graciously lent shells of the respective museum collections. Dr. A. Byron Leonard read the manuscript and offered helpful suggestions.

LITERATURE CITED

Baker, Frank Collins. 1939. Fieldbook of Illinois Land Snails, Natural History Survey Division, Manual 2, State of Illinois: 3-166.

Franzen, Dorothea S. 1963. Variations in the Anatomy of the Succineid Gastropod *Oxyloma retusa.* The Nautilus 76 (3): 82-95, Tables I-II, Figs. 1-4.

Franzen, Dorothea S. 1964. Anatomy of the Succineid Gastropod *Oxyloma haydeni.* The Nautilus 77(3): 73-81, Tables I-II, Fig. 1.

Franzen, Dorothea S. 1966. Anatomy of the Succineid Gastropod *Oxyloma salleana* (Pfeiffer). The Nautilus 80(2): 59-69, Tables I-II, Figs. 1-3.

Franzen, Dorothea S. 1969. Structural Characteristics of Succineid Gastropod *Oxyloma sanibelensis.* The Nautilus 82(3): 77-83, Tables I-III, Figs. 1-2.

Pilsbry, Henry A. 1948. Land Mollusca of North America (North of Mexico). Acad. Nat. Sci. Philadelphia Mon. No. 3, Vol. II, Pt. 2: xlvii + 521-1113, 585 figs.

Quick, H. E. 1933. The Anatomy of British Succineae. Proc. Mala. Soc. London 20(VI, Nov.): 295-318 Pl. 23-25, Figs. 1-18, Tables I–V.